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## (54) IMPROVEMENTS IN OR RELATING TO FERTILIZERS

(71) We, CLIFFORD NEIL WATERS and KEITH ANTHONY WATERS, both British Subjects, of Clifton, Whitehill, Meopham, Kent, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fertilizers.

10 According to the invention, there is provided a process for producing a fertilizer by mixing, or mixing and pulverizing animal manure with an alkaline material and a substantially dry humus material the ingredients having the following percentages by weight:— manure 30 to 78%, humus material 20 to 68%, alkaline material 2 to 20% and additives 0 to 5%.

The invention is specially applicable to poultry manure but can be applied to other manure or a mixture. The alkaline material is preferably quicklime and the humus material is preferably peat but other dry humus material may be used e.g. chopped straw and/or wood shavings.

The ingredients may be as follows in percentage by weight:

Manure	30 to 78 preferably 50 to 78
Humus Material	20 to 68 preferably 20 to 55
30 Quicklime (CaO)	2 to 20 preferably 2 to 9
Additives	0 to 5

In a particular example the mixture is as follows:

Poultry manure	215 lbs.
35 Dry Peat	60-70 lbs.
Quicklime	6-12 lbs.

In carrying out the process measured quantities of the ingredients may be fed into a mixing or mixing and pulverising machine, stored for a period to enable chemical actions to occur, then further pulverised, screened and bagged for sale.

The ingredients may be pulverized individually or in a mixture before being fed to the mixing machine or may be fed to

the mixing and pulverising machine as obtained without prior disintegration. The quicklime is preferably in powder form and is blown into contact with the other ingredients. The temperature of the mixture rises rapidly as the quicklime reacts chemically with the other ingredients. Water vapour and some ammonia are released by this reaction and are removed with or without the assistance of a forced draught. The mixing and pulverising can be accomplished by a suitable machine in 20 to 45 minutes e.g. 30 minutes.

The humus may be passed through a mincer before entering the mixer and the quicklime may be ground in a grinder before entering the mixer.

The ingredients may be filled into hoppers from which measured quantities can be supplied to the mixer.

The ingredients may be fed to metering units which automatically supply predetermined quantities or rates of feed to the mixer.

The mixture may be stored in a holding hopper for 18 to 48 hours or longer, e.g. 24 hours during which time further chemical action takes place and for example feathers which have escaped pulverising become largely consumed leaving only the hard stalks of the larger feathers.

The product may again be stirred or stirred and pulverized and then screened to prevent lumps of peat and feathers from entering the final product. During this final treatment the product becomes aerated which improves its appearance and texture. The product is a fairly fine powder which can easily be filled into plastic or paper sacks.

The process may be carried out in batches or continuously.

An embodiment of the invention will now be described by way of example only with reference to the accompanying drawings in

which:—

Figure 1 is a diagrammatic perspective view of a machine for carrying out the process of the invention,

5 Figure 2 is an elevational view of one of the rotors of the machine of Figure 1 and

Figure 3 is an end view of the rotor showing the circumferential displacement of the blades.

10 Referring to the drawings, the mixing and disintegrating machine consists of a housing 45 shaped to embrace two generally parallel rotors.

The rotors are a mirror image of each other and consist of shafts 46, 47 mounted to rotate in the housing; the shafts carry mixing and chopping blades 49, with the blades on one shaft intermeshing with those on the other shaft. The shafts rotate in the same direction at 120-180 e.g. 140 r.p.m., and are driven by an electric motor (not shown) via a chain and socket transmission arrangement. Each blade may be made from an integral sheet of steel one eighth inch thick shaped to form a radial arm 50 the outer end 51 of which is bent into parallelism with the shaft and is triangular in shape to present a sharpened cutting leading edge. The circumferential displacement of the blades 1 to 11 around their shafts is shown in Figure 3 and their longitudinal displacement is shown in Figure 2, the displacements being such that the blades one one shaft convey the material along in the direction of the shaft in one direction and the blades of the other shaft convey the material in the opposite direction so that the material tends to movement constantly from one end of the housing and back again, round and round, during mixing and chopping.

The housing has an inlet chute 54 which may be divided by a wall (not shown) to provide an inlet for solid ingredients and an air inlet. The air inlet may or may not have a heater.

The housing has a vent 60 which may or may not contain a motor driven extractor fan. The housing also has an outlet for discharge of finished product.

#### WHAT WE CLAIM IS:—

1. A process for producing a fertilizer by mixing, or mixing and pulverizing, animal manure with an alkaline material and a substantially dry humus material, the ingredients having the following percentages by weight:— manure 30 to 78%, humus material 20 to 68%, alkaline material 2 to

20% and additives 0 to 5%.

2. A process as claimed in claim 1 60 wherein the percentages by weight are:— manure 50 to 78%, humus material 20 to 55%, alkaline material 2 to 9% and additives 0 to 5%.

3. A process as claimed in claims 1 or 2 65 wherein the alkaline material is quicklime.

4. A process as claimed in claims 1, 2 or 3 wherein the humus material is any one or more of the following:— peat, chopped 70 straw and wood shavings.

5. A process as claimed in any one of the preceding claims wherein the period of the mixing or mixing and pulverizing step is between 20 and 45 minutes. 75

6. A process as claimed in any one of the preceding claims wherein the ingredients when mixed are stored for a period greater than the mixing period, for example 18 hours or more. 80

7. A process as claimed in claim 6 wherein the mixture after the storing period is stirred or stirred and pulverized and then screened to produce the final product as a fine powder. 85

8. A process as claimed in any one of the preceding claims wherein the animal manure is poultry manure.

9. A process as claimed in any one of the preceding claims wherein the quicklime 90 is in powder form or is ground to a powder and is then blown into a mixing chamber.

10. A machine when used for carrying out the process of any one of the preceding claims, including, in combination, a housing and two generally parallel rotors 95 mounted for rotation in the housing, each rotor carrying longitudinally and circumferentially spaced blades, and the blades of the two rotors intermeshing so that upon rotation of the rotors in the same direction the mixture is conveyed in one direction by one shaft and in an opposite direction by the other shaft. 100

11. A process for producing a fertiliser 105 as claimed in Claim 1 and substantially as described herein.

12. A machine when used for carrying out the process of any one of claims 1 to 10 and substantially as herein described 110 with reference to, and as illustrated in the accompanying drawings.

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